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Connecting material stocks to services: The example of steel use in UK vehicles

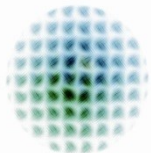
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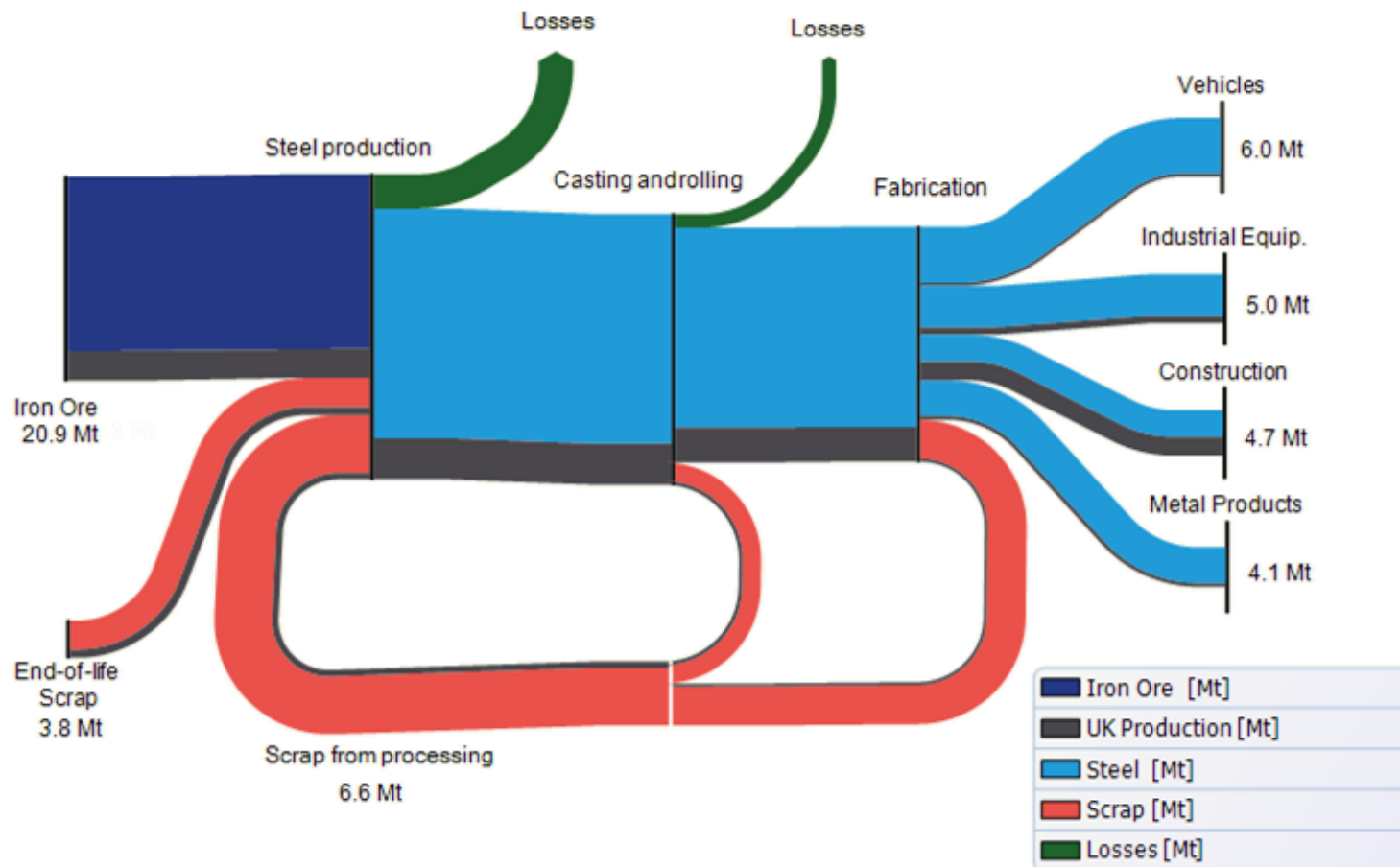
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Why steel, why vehicles, why service?



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Steel flows to supply UK demand, 2007



- **To build a numerical model to understand the relationship between car service and the stocks and flows of materials (especially steel).**
- **For each key input to examine the effect of different scenarios on material demand.**
- **To use this to inform further studies, including lessons for energy and emissions policy.**

Modelling approach



Service requirement:
Passenger-km



Stock required:
Passenger cars



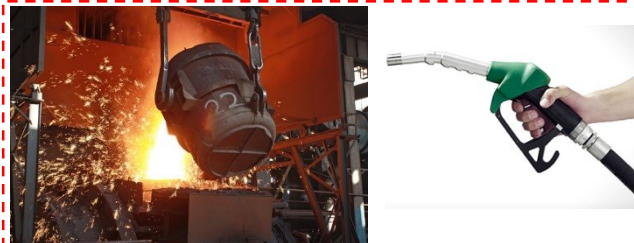
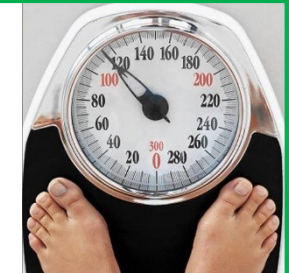
New cars required



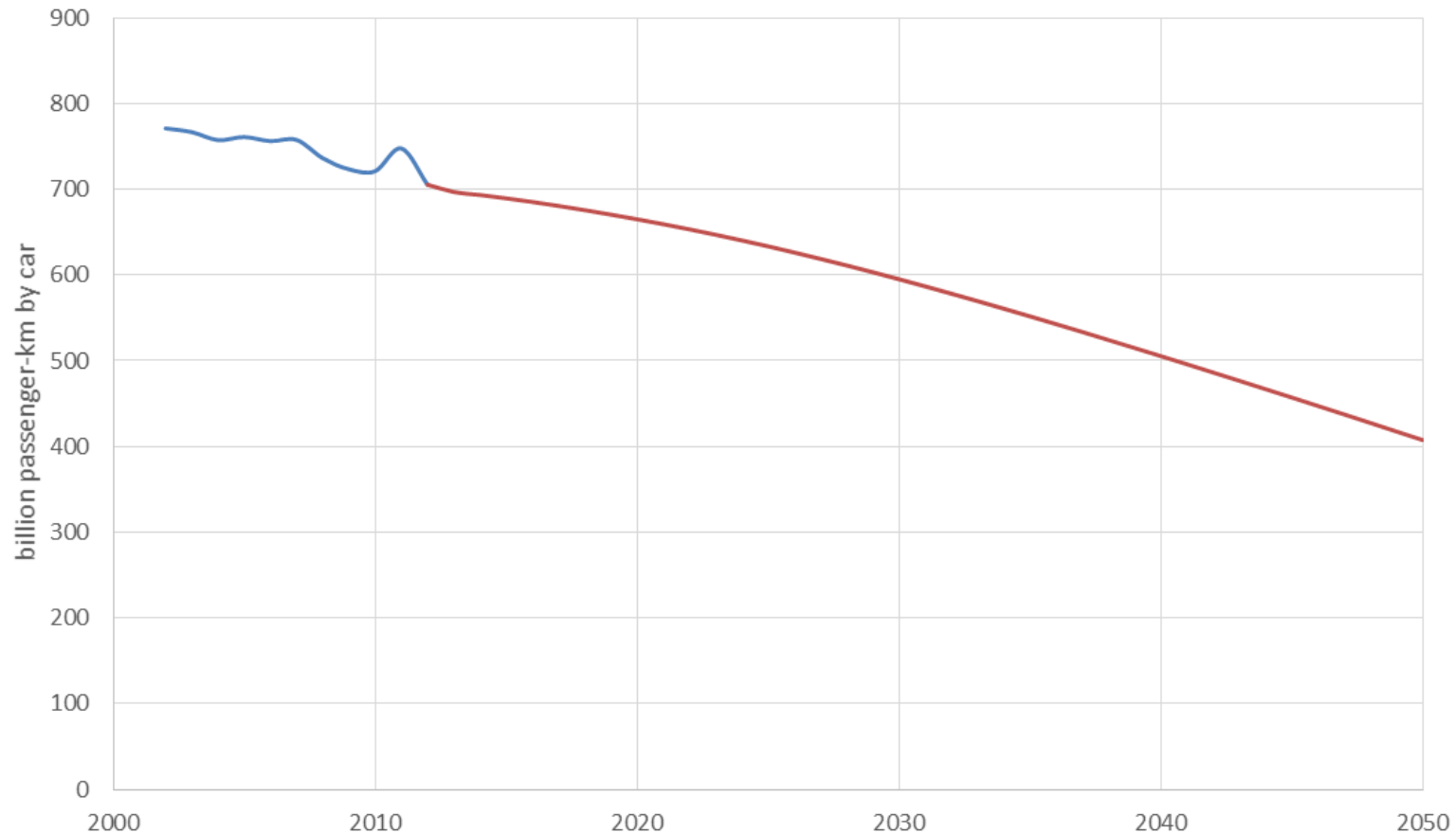
Material required



Energy and
emissions



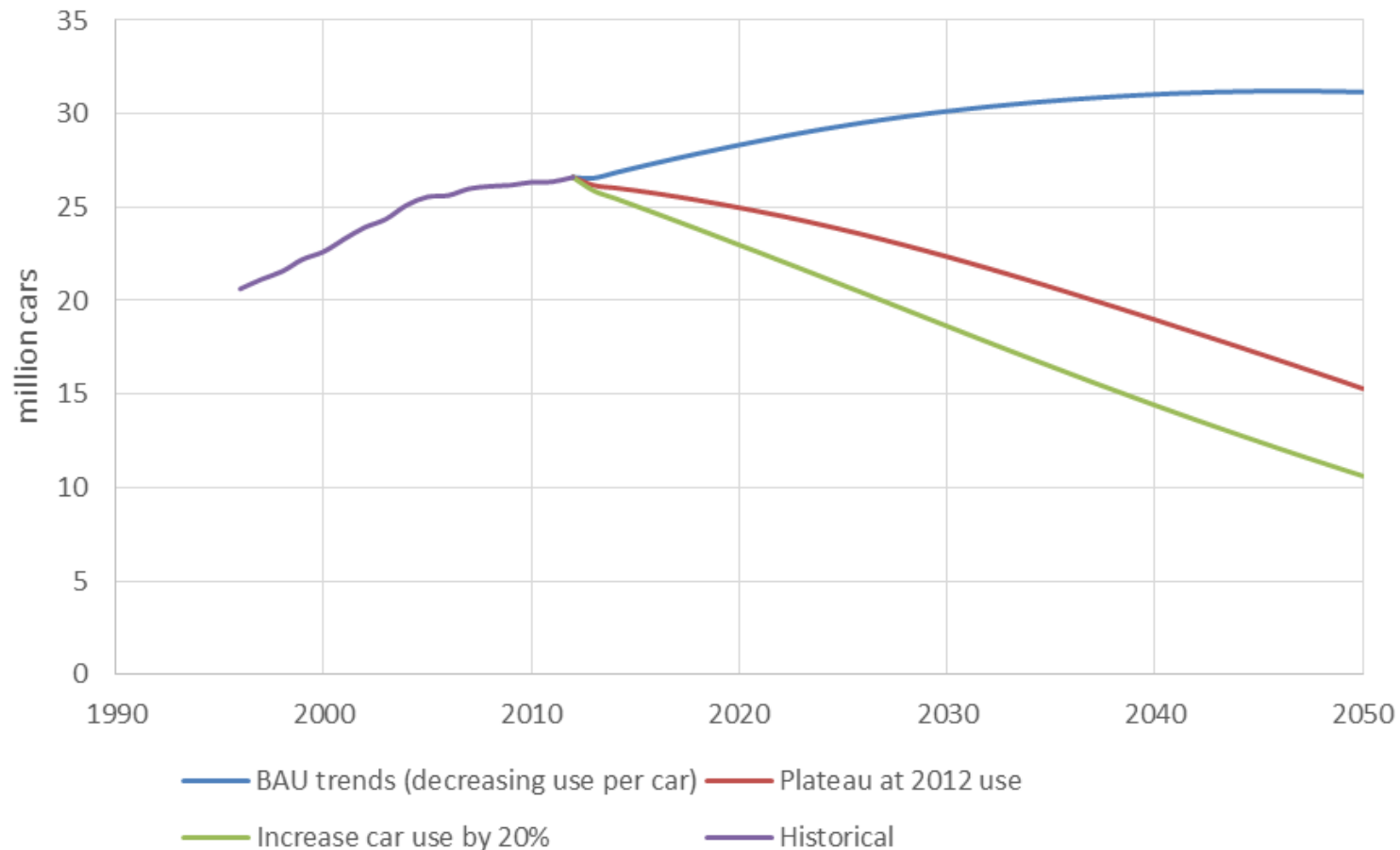
Service required



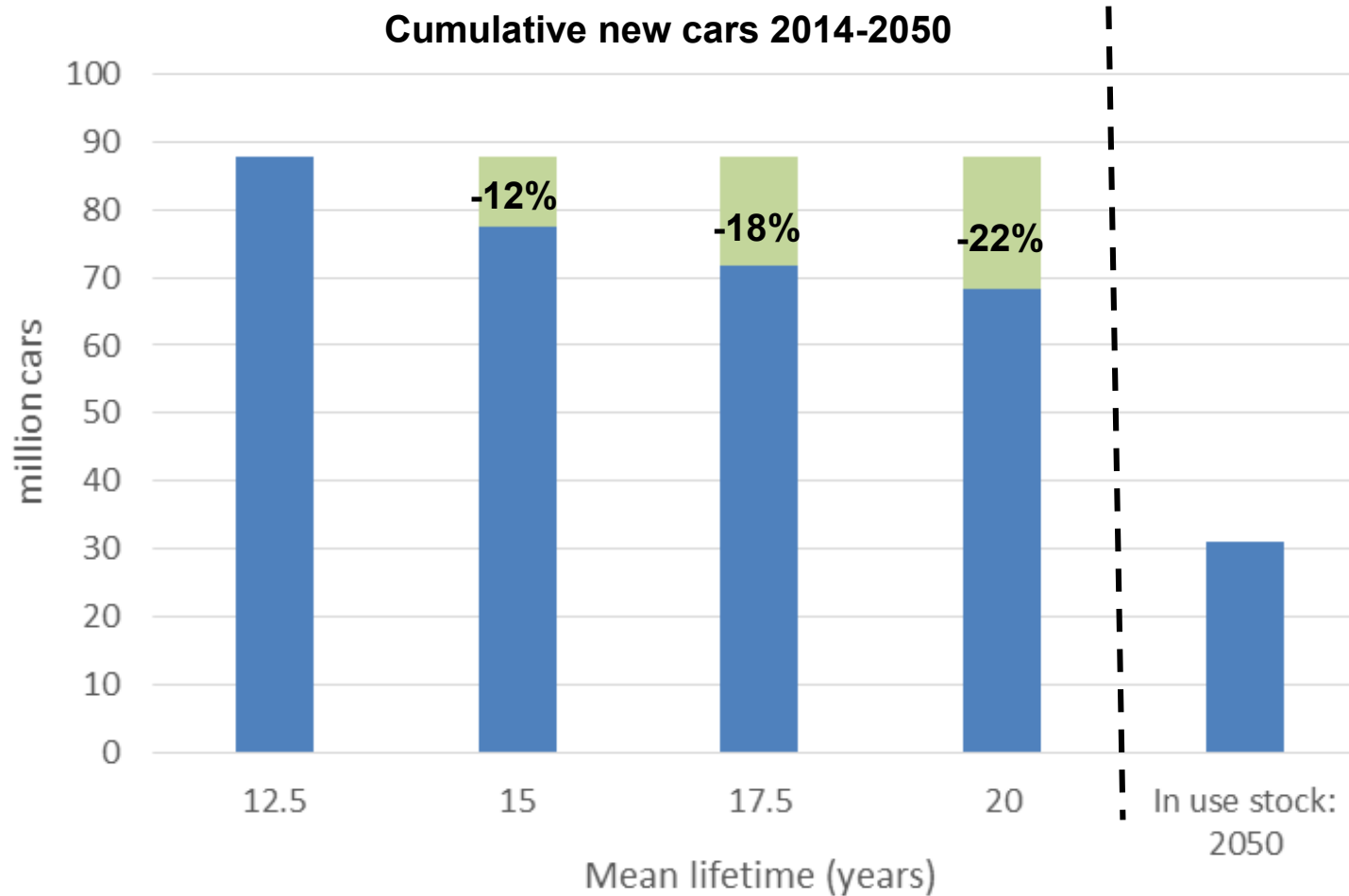
Based on: Schafer, A. and Victor, D.G., 2000. The future mobility of the world population. *Transportation Research Part A: Policy and Practice*, 34 (3), pp. 171-205

Schafer, A., Heywood, J.B., Jacoby, H.D. and Waitz, I.A., 2009. *Transportation in a Climate-Constrained World*. Cambridge, USA: MIT Press.

Stock required to provide service

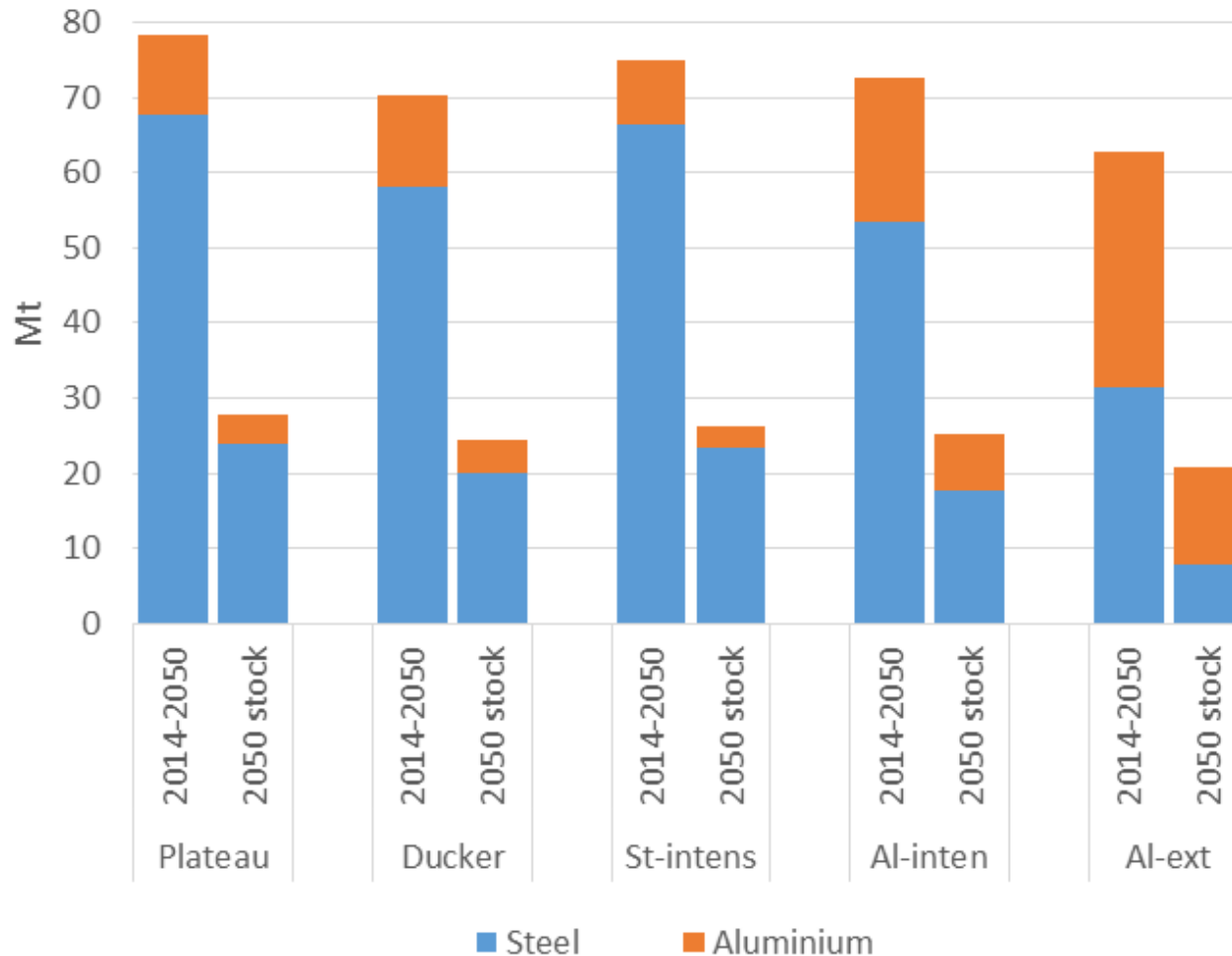


New cars required



BAU stock scenario

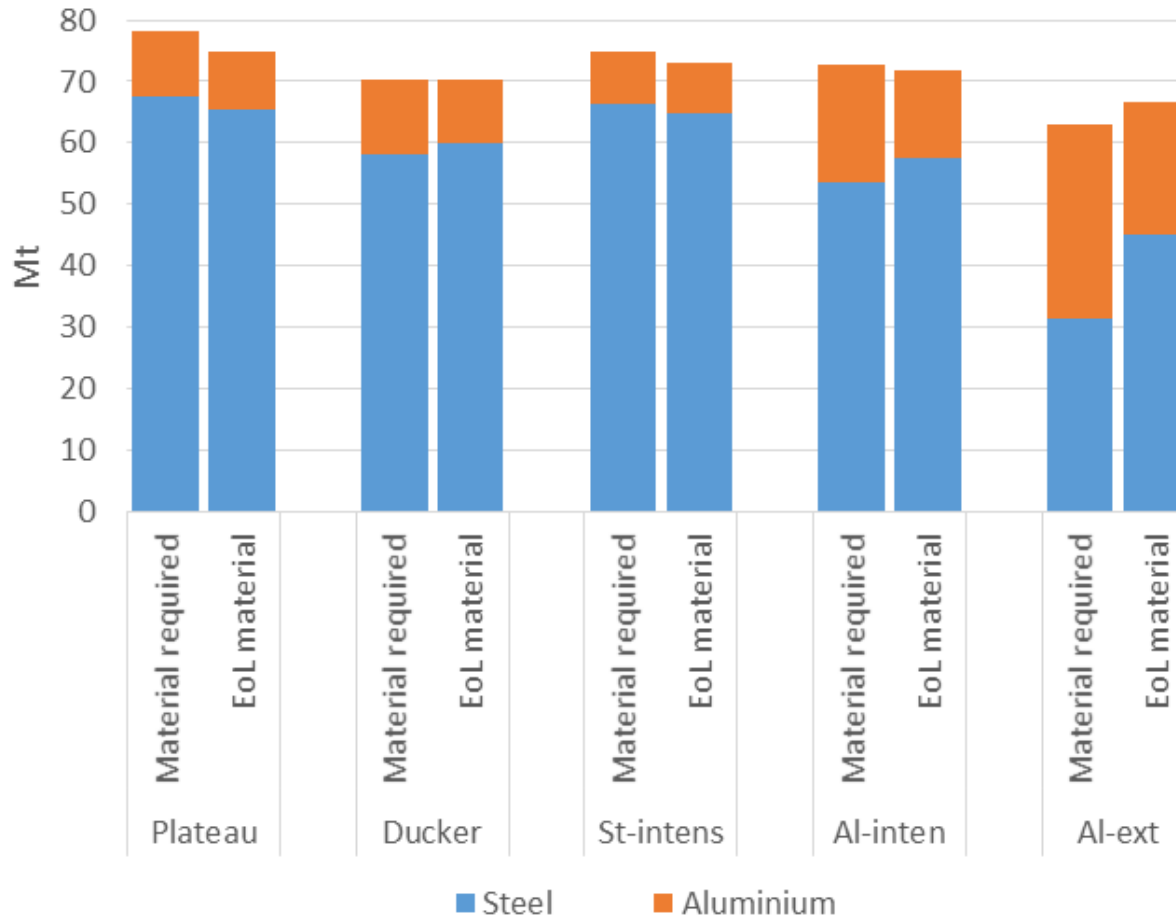
Material required



BAU scenarios for stock required and lifetime

Material composition scenarios adapted from: Modaresi, R., Pauliuk, S., Løvik, A.N. and Müller, D.B., 2014. Global Carbon Benefits of Material Substitution in Passenger Cars until 2050 and the Impact on the Steel and Aluminum Industries. *Environmental Science & Technology*, 48 (18), pp. 10776-10784.

Material required

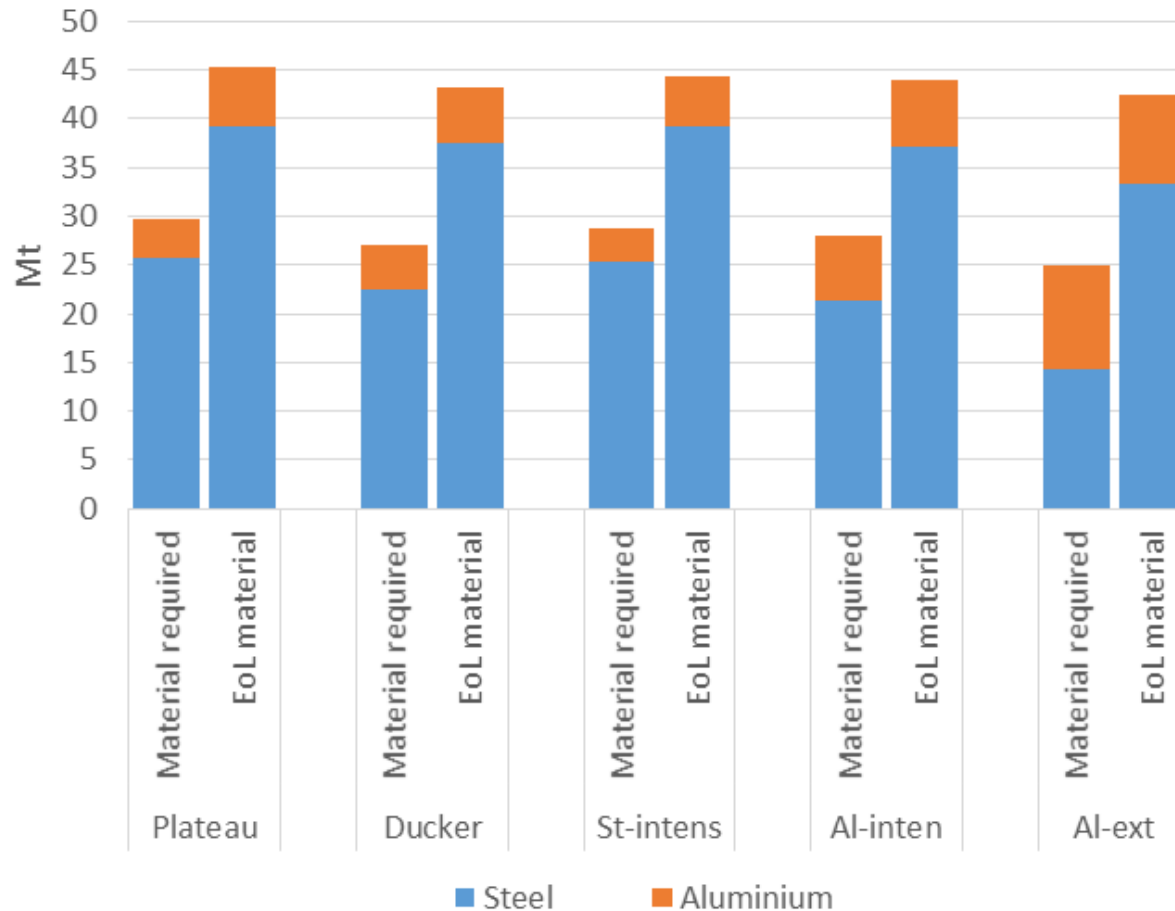


BAU scenarios for stock required and lifetime.

Cumulative material 2014-2050 shown.

Scenarios adapted from:
Modaresi, R., Pauliuk, S.,
Løvik, A.N. and Müller,
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Material required

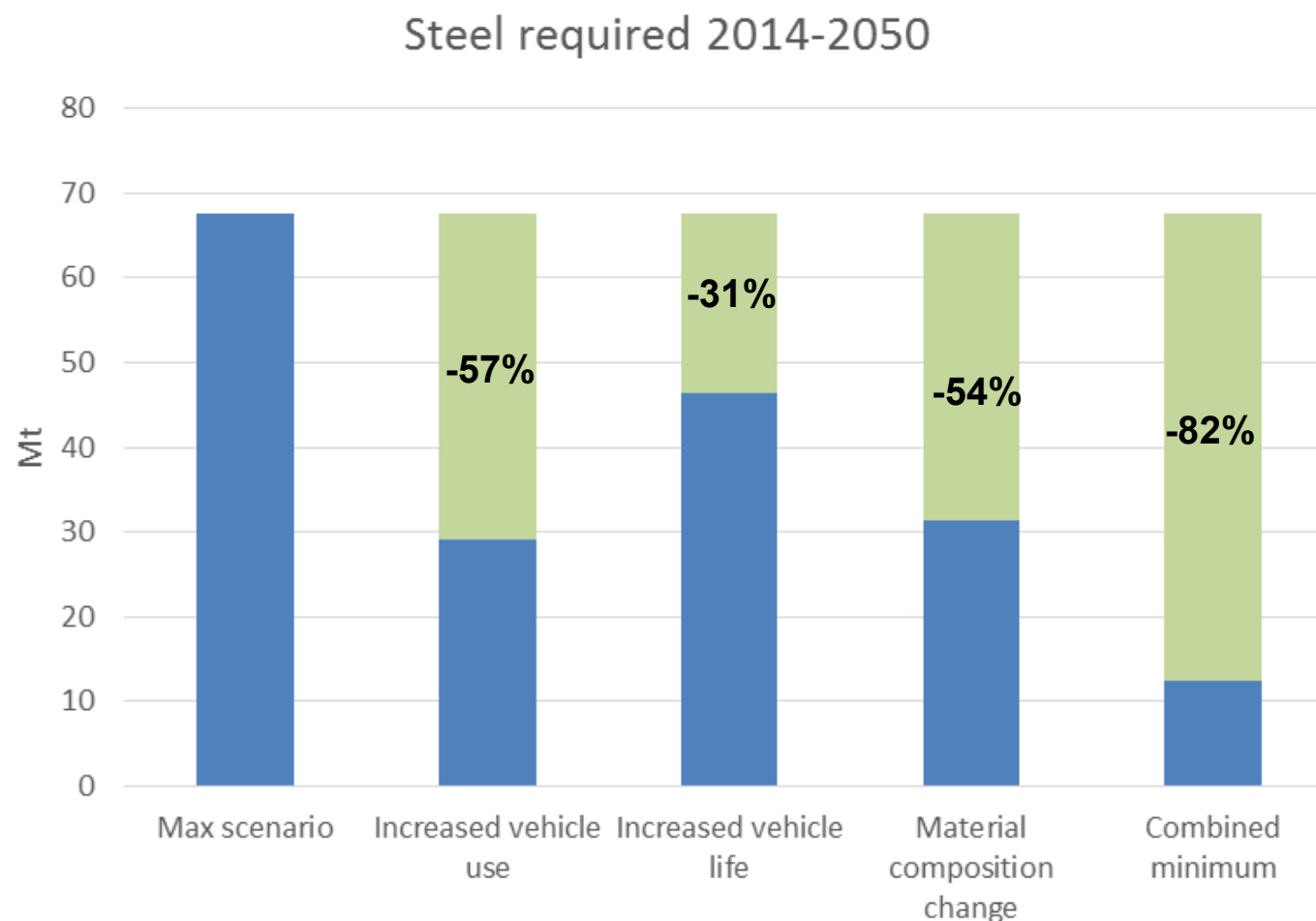


Increased utilisation of stock and maximum vehicle lifetime.

Cumulative material 2014-2050 shown.

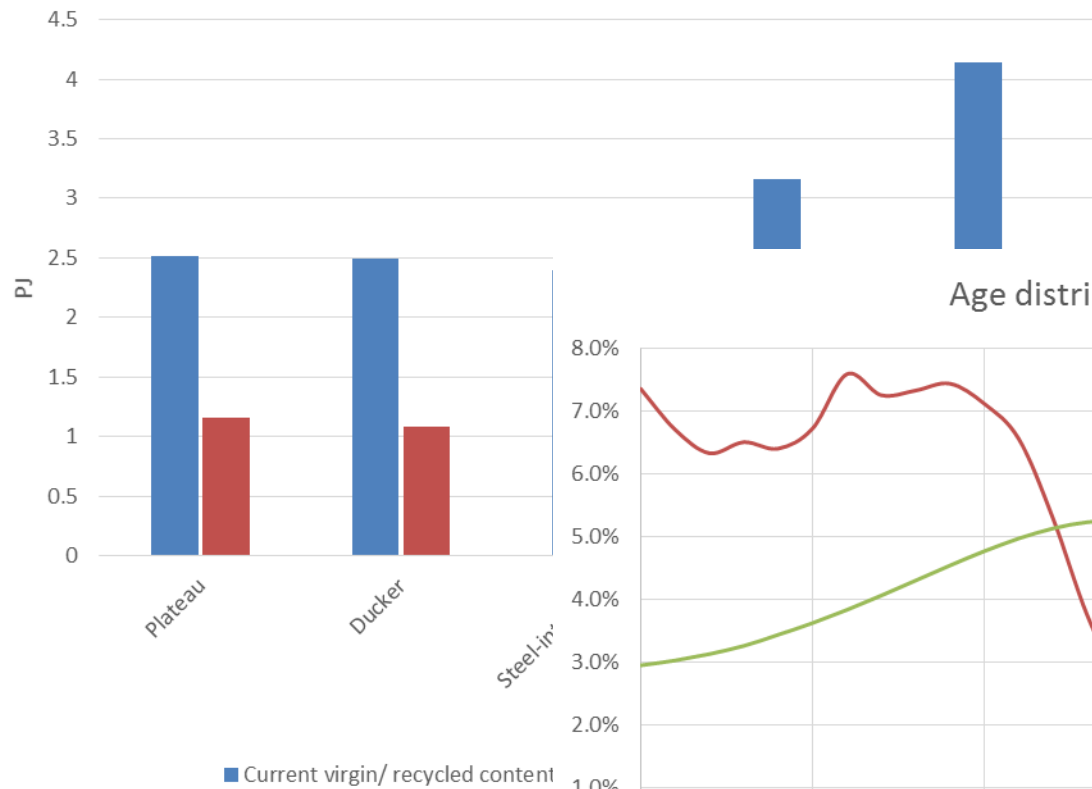
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What has the biggest effect?

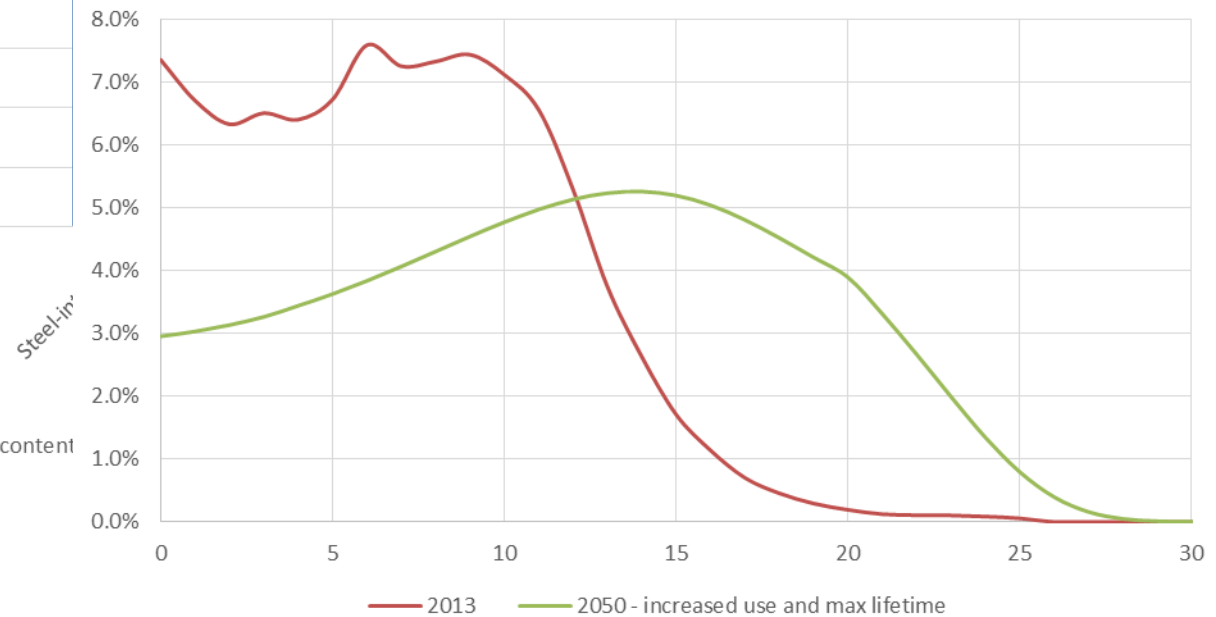


What's next?

Primary energy for material production 2014-2050



Age distribution of stock



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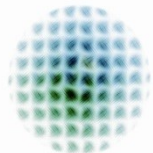
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